

CLAIMS

We claim:

1. A playing card, comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings; and

a conductive material carried by the playing card, the conductive material defining a response profile to electromagnetic interrogation that uniquely corresponds to at least the rank marking on the face surface of the face substrate.

2. The playing card of claim 1, further comprising:

a base substrate having a first surface and a second surface opposed to the first surface, wherein the conductive material is disposed on the inner surface of the face substrate, and the face substrate and the base substrate form a laminate structure having the inner surface of the face substrate facing the first surface of the base substrate to overlay the conductive material disposed on the inner surface of the face substrate.

3. The playing card of claim 1, further comprising:

a base substrate having a first surface and a second surface opposed to the first surface, wherein the conductive material is disposed on the first surface of the base substrate, and the face substrate and the base substrate form a laminate structure having the inner surface of the face substrate facing the first surface of the base substrate to overlay the conductive material disposed on the first surface of the base substrate.

4. The playing card of claim 1, further comprising:

a base substrate having a first surface and a second surface opposed to the first surface, wherein the conductive material is disposed on at least one of the first and the second surfaces of the base substrate; and

a back substrate having an inner surface and a back surface opposed to the inner surface, wherein the face substrate, base substrate and the back substrate form a laminate structure having the inner surface of the face substrate facing the first surface of the base substrate and the inner surface of the back substrate facing the second surface of the face substrate to overlay the conductive material carried by the playing card.

5. The playing card of claim 1, further comprising:

a back substrate having an inner surface and a back surface opposed to the inner surface; and

a non-conductive base substrate having a first surface and a second surface opposed to the first surface, wherein the conductive material is disposed on at least one of the inner surfaces of the face substrate and the back substrate, and the face substrate, base substrate and the back substrate form a laminate structure having the inner surface of the face substrate facing the first surface of the base substrate and the inner surface of the back substrate facing the second surface of the face substrate to insulate the conductive material.

6. The playing card of claim 1 wherein the conductive material comprises a plurality of conductive particles distributed in the face substrate.

7. The playing card of claim 1 wherein the human-readable rank and suit markings are printed on the face surface of the face substrate; and the conductive material includes a plurality of conductive particles distributed within at least a portion of the human-readable rank and suit markings.

8. The playing card of claim 1 wherein conductive material carried by the playing card comprises a trace deposited on at least one surface of the playing card.

9. The playing card of claim 1 wherein conductive material carried by the playing card comprises a trace etched from a conductive layer deposited on at least one surface of the playing card.

10. A playing card, comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings;

a base substrate having a first surface and a second surface opposed to the first surface; and

a conductive material disposed on at least one of the inner surface of the face substrate and the first surface of the base substrate to form at least a portion of a resonant circuit, wherein the face substrate and the base substrate form a laminate structure having the inner surface of the face substrate facing the first surface of the base substrate to protectively envelope at least a portion of the conductive material.

11. The playing card of claim 10 wherein the conductive material is disposed on the first and second surfaces of the base substrate, and further comprising:

a back substrate having an inner surface and a back surface opposed to the inner surface, the back substrate forming a portion of the laminate structure where the inner surface of the back substrate faces the second surface of the base substrate.

12. The playing card of claim 10, further comprising:

a back substrate having an inner surface and a back surface opposed to the inner surface, wherein the conductive material is disposed on the inner surfaces of the face substrate and the back substrate, the back substrate forming a portion of the

laminate structure where the inner surface of the back substrate faces the second surface of the base substrate .

13. The playing card of claim 10 wherein the resonant circuit has a resonant frequency that is uniquely related to at least the rank marking on the face surface of the playing card.

14. A playing card, comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings;

a base substrate having a first surface and a second surface opposed to the first surface; and

a conductive material disposed on at least one of the surfaces of the base substrate to form at least a portion of a resonant circuit, wherein the face substrate and the base substrate form a laminate structure having the inner surface of the face substrate facing the first surface of the base substrate to protectively envelope at least a portion of the conductive material.

15. The playing card of claim 14 wherein the conductive material is disposed on both the first and the second surfaces of the base substrate, and further comprising:

a back substrate having an inner surface and a back surface opposed to the inner surface, the back substrate forming a portion of the laminate structure having the inner surface of the back substrate facing the second surface of the base substrate.

16. The playing card of claim 14 wherein the resonant circuit has a resonant frequency that is uniquely related to at least the rank marking on the face surface of the playing card:

17. A playing card, comprising:

a face substrate having a pair of opposed surfaces, a first one of the surfaces bearing human-readable rank and suit markings; and

a plurality of conductive elements distributed in the face substrate, the distribution of the conductive elements uniquely identifiable to at least a value of the rank marking.

18. A playing card, comprising:

a face substrate having a face surface;

a set of human-readable rank and suit markings printed on the face surface of the face substrate; and

a plurality of conductive elements distributed within the human-readable rank and suit markings, the distribution of the conductive elements uniquely identifiable to at least a value of the rank marking.

19. A set of playing cards, comprising:

a plurality of playing cards, each playing card comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings; and

a conductive material carried by the playing card and defining a response profile to electromagnetic interrogation that uniquely corresponds to at least the rank marking on the face surface of the face substrate of the respective playing card.

20. The set of playing cards of claim 19 wherein the plurality of playing cards all have respective ranks selected from the group consisting of Ten, Jack, Queen, King and Ace.

21. The set of playing cards of claim 19 wherein the plurality of playing cards all have respective ranks selected from the group consisting of Ten, Jack, Queen, King and Ace, and further comprising:

an additional plurality of playing each comprising a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings and a conductive material carried by the playing card and defining a response profile to electromagnetic interrogation that does not uniquely correspond to the rank marking on the face surface of the face substrate of the respective playing card, and wherein the additional plurality of playing cards all have respective ranks selected from the group consisting of Two, Three, Four, Five, Six, Seven, Eight and Nine.

22. A playing card reader, comprising:

a housing having a receptacle sized to receive a plurality of playing cards;

a transmitter received in the housing;

a receiver received in the housing; and

at least a first antenna electrically coupled to at least one of the transmitter and the receiver, the first antenna positioned to electro-magnetically interrogate at least some of the playing cards.

23. The reader of claim 22 wherein the first antenna is positioned to electro-magnetically interrogate the playing cards one at a time, as each of the playing cards is removed from the housing.

24. The reader of claim 22 wherein at least a portion of the housing comprises a radio frequency barrier positioned between the receptacle and an exit of the housing, and the first antenna is positioned with respect to the radio frequency barrier and the exit to electro-magnetically interrogate the playing cards one at a time, as each of the playing cards is removed from the housing.

25. The reader of claim 22 wherein the first antenna is positioned to electro-magnetically interrogate a number of the playing cards in the receptacle simultaneously.

26. The reader of claim 22 wherein the first antenna is positioned to electro-magnetically interrogate the playing cards one at a time, as each of the playing cards is in the receptacle.

27. The reader of claim 22 wherein the receiver receives at a first frequency from playing cards having a rank selected from the group consisting of Ten, Jack, Queen and King, and at a second frequency from playing cards having a rank of Ace.

28. The reader of claim 22 wherein the transmitter and the receiver take the form of a transceiver.

29. A system for wirelessly monitoring wagering and play of a playing card game at a gaming table using playing cards and wagering chips each bearing conductive material, the system comprising:

a card reader having a wireless transmitter and receiver coupled to at least a first antenna to electro-magnetically interrogate playing cards;

a chip reader having at least one wireless transmitter and receiver coupled to a plurality of antennas positioned proximate to respective wagering placement areas to electro-magnetically interrogate wagering chips placed at the wager placement areas, if any; and

a computing system coupled to receive data from both the wireless card reader and the wireless chip reader.

30. The system of claim 29, further comprising:
a card shoe having a receptacle sized and dimensioned for holding a plurality of playing cards, wherein the card reader is housed in the card shoe.

31. The system of claim 29, further comprising:
a chip tray; and
a chip tray reader having at least one wireless transmitter and receiver coupled to at a plurality of antennas positioned in the chip tray to electro-magnetically interrogate wagering chips placed at the chip tray, if any, the chip tray reader coupled to the computing system to provide data thereto.

32. The system of claim 29, further comprising:
a dealer's hand reader having at least one wireless transmitter and receiver coupled to at a plurality of antennas positioned to electro-magnetically interrogate at least one playing card forming a dealer's initial hand when positioned proximate thereto, the dealer's hand reader coupled to the computing system to provide data thereto.

33. A method of automating a card game, comprising:
wirelessly interrogating each of a plurality of playing cards using radio frequency transmissions; and
for at least some of the playing cards, determining a rank of the playing card based on the wireless interrogation.

34. The method of claim 33 wherein wirelessly interrogating each of a plurality of playing cards includes transmitting radio frequency energy toward the playing cards, and receiving a radio frequency signal in return from at least some of the playing cards.

35. The method of claim 33 wherein wirelessly interrogating each of a plurality of playing cards includes transmitting radio frequency energy toward the playing cards and receiving a radio frequency signal in return from at least some of the playing cards, while the playing cards are in a card shoe.

36. The method of claim 33 wherein wirelessly interrogating each of a plurality of playing cards includes transmitting radio frequency energy toward the playing cards and receiving a radio frequency signal in return from at least some of the playing cards while the playing cards are being withdrawn from a card shoe.

37. The method of claim 33 wherein wirelessly interrogating each of a plurality of playing cards includes transmitting a radio frequency interrogation signal encoding a first key toward the playing cards and determining whether a return radio frequency signal is returned from at least one of the playing cards in response to the radio frequency interrogation signal; and wherein the rank of the playing card is determined based on the presence and absence of the return radio frequency signal.

38. The method of claim 33 wherein determining a rank of the playing card based on the wireless interrogation includes determining decoding a return radio frequency signal returned from at least one of the playing cards in response to the wireless interrogation.

39. The method of claim 33, further comprising:
wirelessly interrogating each of a plurality of wagering chips using radio frequency transmissions.

40. The method of claim 33, further comprising:
wirelessly interrogating each of a plurality of wagering chips using radio frequency transmissions;

determining a value of each of a number of wagers based on the wireless interrogation of the wagering chips; and

determining an outcome of at least one wager based on the determined rank of the playing cards and the determined value of the wagers.

41. A set of playing cards, comprising:

a first plurality of playing cards each having a value of ten, each playing card in the first plurality of playing cards comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings; and

a conductive material carried by the playing card responsive to radio frequency interrogation; and

a second plurality of playing cards each having a rank of ACE, each playing card in the second plurality of playing cards comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings; and

a conductive material carried by the playing card responsive to radio frequency interrogation, wherein the conductive material is positioned at a first location on each of the playing cards in the first plurality of playing cards and at a second location, different than the first location, on each of the playing cards of the second plurality of playing cards.

42. The set of playing cards of claim 41, further comprising:

a third plurality of playing cards having a value of other than one, ten and eleven, each playing card in the third plurality of playing cards comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings; and

omitting a conductive material responsive to radio frequency interrogation.

43. The set of playing cards of claim 41, further comprising:

a third plurality of playing cards having a value of other than one, ten and eleven, each playing card in the third plurality of playing cards comprising:

a face substrate having a face surface and an inner surface opposed to the face surface, the face surface of the face substrate bearing human-readable rank and suit markings; and

a conductive material carried by the playing card responsive to radio frequency interrogation, wherein the conductive material is positioned at a third location, different than the first and the second locations, on each of the playing cards of the third plurality of playing cards.

44. A playing card reader, comprising:

means for radio frequency interrogating a playing card; and

means for determining a position of a conductive material on the playing card in response to the radio frequency interrogation.

45. The playing card reader of claim 44, wherein the means for determining a position of a conductive material on the playing card in response to the radio frequency interrogation comprises at least a first and a second antenna spaced from one another:

46. The playing card reader of claim 44 wherein the playing card reader comprises a radio frequency barrier and wherein the means for determining a position

of a on the playing card in response to the radio frequency interrogation comprises at least a first and a second antenna spaced on opposite sides of the radio frequency barrier from one another.

47. The playing reader of claim 44 further comprising a card shoe housing the means for radio frequency interrogation means and the position determining means.

48. The playing reader of claim 44 wherein the playing card reader comprises a radio frequency barrier and wherein the radio frequency interrogation means comprises a transmitter and an antenna positioned to transmit an RF signal on both sides of the RF barrier simultaneously.

49. The playing reader of claim 44 wherein the playing card reader comprises a radio frequency barrier and wherein the radio frequency interrogation means comprises a transmitter and at least a first and a second antenna, the first and the second antennas positioned to on opposite sides of the radio frequency barrier from one another.

50. A method of identifying playing cards, comprising:
for each playing card,
transmitting at least a first radio frequency interrogation signal;
receiving a radio frequency response from the playing card; and
determining a value of the playing card based on the received radio frequency response.

51. The method of claim 50 wherein determining a value of the playing card based on the received radio frequency response includes determining a position on the playing card from which the response emanates.

52. The method of claim 50 wherein determining a value of the playing card based on the received radio frequency response includes determining whether the response is received at a first antenna or a second antenna, spaced across and radio frequency barrier from the first antenna.